

REMARKS

Entry of the above amendment and reconsideration of the above-referenced application in view of the above amendment, and of the following remarks, is respectfully requested.

Claims 1-7 and 9-12 are pending in this case. Claim 1 is amended herein.

The Examiner rejected claims 1-7 and 9-12 under 35 U.S.C. § 103(a) as being unpatentable over Zistl et al. (U.S. Patent 6,806,191) in view of Yu et al. (U.S. Patent 6,764,952).

Applicant respectfully submits that amended claim 1 is patentable over Zistl in view of Yu as there is no disclosure or suggestion in the references of after chemically-mechanically polishing a copper film, gaseously doping the copper film with silicon without forming a copper silicide by flowing a gas chemistry consisting of silane over the copper film with the RF power off. Zistl teaches flowing nitrogen and ammonia and applying an RF power to create a first plasma environment. Zistl then teaches adding silane to the first plasma environment to create a second plasma environment. Zistl does not teach a gas chemistry consisting of silane nor flowing silane over the copper film with the RF power off. The RF power in Zistl is applied when forming the first plasma environment (Col. 3, lines 63-66). Silane is then added to the first plasma environment to create the second plasma environment (Col. 4, lines 7-11). In Zistl, there is no disclosure or suggestion of flowing silane while the RF power is off as required by the claim. Yu is added to teach flowing silane over copper. However, Yu likewise teaches a plasma clean (pre-treatment) in which the RF power is on (e.g., Table 1--200-300W/showerhead) and immediately following this step with the application of an organosilane precursor (col. 4, lines 36-40). Table 2 specifically lists an RF power level for the organosilane treatment as being 170 W/showerhead. Yu does not disclose or suggest flowing silane with the RF power off. Neither reference, alone or in combination,

teaches gaseously doping the copper film with silicon without forming a copper silicide by flowing a gas chemistry consisting of silane over the copper film with the RF power off. Accordingly, Applicant respectfully submits that claim 1 and the claims dependent thereon are patentable over the references.

Applicant respectfully submits that claim 3 is similarly patentable over the references.

Applicant respectfully submits that claim 7 is patentable over Zistl in view of Yu as there is no disclosure or suggestion in the references of doping a copper interconnect with silicon without forming a silicide by flowing silane over a surface of the copper interconnect with an RF power off prior to striking a plasma. Zistl teaches flowing nitrogen and ammonia and applying an RF power to create a first plasma environment. Zistl then teaches adding silane to the first plasma environment to create a second plasma environment. Zistl does not teach flowing silane over the copper film with the RF power off prior to striking a plasma. The RF power in Zistl is applied when forming the first plasma environment (Col. 3, lines 63-66). Silane is then added to the first plasma environment to create the second plasma environment (Col. 4, lines 7-11). In Zistl, there is no disclosure or suggestion of flowing silane while the RF power is off prior to striking the plasma as required by the claim. Yu is added to teach flowing silane over copper. However, Yu likewise teaches a plasma clean (pre-treatment) in which the RF power is on (e.g., Table 1--200-300W/showerhead) and immediately following this step with the application of an organosilane precursor (col. 4, lines 36-40). Table 2 specifically lists an RF power level for the organosilane treatment as being 170 W/showerhead. Yu does not disclose or suggest flowing silane with the RF power off prior to striking a plasma. Neither reference, alone or in combination, teaches doping the copper interconnect with silicon without forming a silicide by flowing silane over a surface of the copper interconnect with an RF power off prior to striking a plasma. Accordingly, Applicant respectfully submits that claim 7 and the claims dependent thereon are patentable over the references.

In light of the above, Applicant respectfully requests withdrawal of the Examiner's rejections and allowance of claims 1-7, and 9-12. If the Examiner has any questions or other correspondence regarding this application, Applicant requests that the Examiner contact Applicant's attorney at the below listed telephone number and address.

Respectfully submitted,

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